AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (Currently amended) A transducer element for ultrasound transmission and reception comprising:

a first active transducer layer connected to a first receiver and a first transmitter; and

a second active transducer layer laminated to the first active transducer layer and connected to a second receiver and a second transmitter,

wherein the first active transducer layer includes a first pair of composite layers and the second active transducer layer includes a second pair of composite layers.

2. (Original) The transducer element of claim 1, and comprising passive circuitry for processing a first pulse and a second pulse.

3. (Original) The transducer element of claim 2, wherein the passive circuitry provides the first pulse with a different amplitude than an amplitude of the second pulse prior to being combined into a single pulse.

4. (Original) The transducer element of claim 2, wherein the passive circuitry provides the first and second pulses with different time delays prior to being combined into a single pulse.

5. (Original) The transducer element of claim 2, wherein the passive circuitry provides the first pulse with a different shape than a shape of the second pulse prior to being combined into a single pulse.

6. (Original) The transducer element of claim 1, wherein each active layer is connected to a separate voltage source when the transducer element is in a transmit mode.

7. (Currently amended) A transducer element for ultrasound transmission and reception comprising:

a first active transducer layer connected to a first receiver and a first transmitter;

a second active transducer layer laminated to the first active transducer layer and connected to a second receiver and a second transmitter,

wherein the first active transducer layer includes a first pair of composite layers and the second active transducer layer includes a second pair of composite layers; and

passive circuitry for processing a first pulse and a second pulse,

wherein the passive circuitry in a transmit mode performs in accordance with the following equation: $M_1\gamma_1=D_1(f)T_1(f)$,

wherein M_1 defines frequency dependent matching circuitry elements, γ_1 defines said passive circuitry including at least one of an inductor, a capacitor and a resistor, $D_1(f)$ defines electronic tuning circuitry responses, $T_1(f)$ defines a transmit transfer function and f defines a frequency.

8. (Currently amended) A transducer element for ultrasound transmission and reception comprising:

a first active transducer layer connected to a first receiver and a first transmitter;

a second active transducer layer laminated to the first active transducer layer and connected to a second receiver and a second transmitter,

wherein the first active transducer layer includes a first pair of composite layers and the second active transducer layer includes a second pair of composite layers; and

passive circuitry for processing a first pulse and a second pulse,

wherein the passive circuitry in a receive mode performs in accordance with the following equation: $G_1=\gamma_1 g_1$,

wherein G_1 defines an overall receive transfer function and γ_1 or g_1 include said passive circuitry, wherein said passive circuitry includes at least one of an inductor, a capacitor, a resistor and a probe cable.

9. (Original) The transducer element of claim 1, and comprising a switch for switching the transducer element from a transmit mode to a receive mode.

10. (Original) The transducer element of claim 1, wherein the first and second receivers each are associated with at least one filtering device.

11. (Original) The transducer element of claim 10, wherein analog-to-digital conversion is performed at least one of before and after a signal has passed through the at least one filtering device.

12. (Original) The transducer element of claim 10, wherein filtering is performed prior to amplification of a signal by one of the receivers.

13. (Original) The transducer element of claim 10, wherein filtering is performed after amplification of a signal by one of the receivers.

14. (Original) The transducer element of claim 13, wherein filtering is performed before and after amplification of a signal by one of the receivers.

15. (Original) The transducer element of claim 1, wherein the first receiver comprises a first electrical filtering device and the second receiver comprises a second electrical filtering device, wherein the first and second electrical filtering devices optimize a combined received pulse prior to image coding.

16. (Original) A transducer element for ultrasound transmission and reception comprising:

a first active transducer layer connected to a first receiver and a first transmitter;

a second active transducer layer laminated to the first active transducer layer and connected to a second receiver and a second transmitter; and

passive circuitry wherein a first pulse produced by the first transmitter and a second pulse produced by the second transmitter are processed by the passive circuitry prior to being combined into a single ultrasound pulse.

17. (Original) A transducer element for ultrasound transmission and reception comprising:

a first active transducer layer connected to a first receiver and a first transmitter;

a second active transducer layer laminated to the first active transducer layer and connected to a second receiver and a second transmitter; and

wherein the first and second receivers each comprise an electrical filtering device to optimize a combined received electrical pulse prior to image coding.

18. (Currently amended) A transducer array comprising:

a plurality of transducer elements wherein at least two transducer elements each comprise:

a first active transducer layer connected to a first receiver; and

a second active transducer layer laminated to the first active transducer layer and connected to a second receiver,

wherein a first active transducer layer of a first transducer element is connected to a circuit having different properties than a circuit connected to a first active transducer layer of a second transducer element.

19. (Currently amended) The transducer array of claim 18, wherein **[[a]]the** first active transducer layer of **[[a]]the** first transducer element comprises different material than **[[a]]the** first active transducer layer of **[[a]]the** second transducer element.

20. (Currently amended) The transducer array of claim 19, wherein a second active transducer layer of **[[a]]the** first transducer element comprises different material than a second active transducer layer of **[[a]]the** second transducer element.

21. (Original) The transducer array of claim 18, wherein electrical properties of the first receiver are different from electrical properties of the second receiver.

22. (Original) The transducer array of claim 18, wherein the first active transducer layer is connected to circuitry having different electrical properties than electrical properties of the second active transducer layer.

23. (Canceled)

24. (Currently amended) The transducer array of claim **[[23]]**<u>**18**</u>, wherein a second active transducer layer of the first element is connected to a circuit having different properties than the circuit connected to the first active transducer layer of the first element.

25. (Original) The transducer array of claim 18, in which the first active transducer layer of at least two of the elements are connected to focusing electronics that are separate and different from focusing electronics connected to the second active transducer layer of the same at least two elements to provide independent focusing.

26. (Original) The transducer array of claim 18, in which all of the active layers within a single element are connected to separate focusing electronics to provide independent focusing.

27. (Original) The transducer array of claim 18, wherein the first and second receivers of each element each comprise electrical filtering capability to optimize a combined received pulse prior to image coding.

28. (Original) The transducer array of claim 18, and comprising first and second transmitters.

29. (Original) The transducer array of claim 28, and comprising passive circuitry wherein a first pulse and a second pulse are processed by the passive circuitry to have at least one of the following: different amplitudes, different time delays, and different shapes, prior to being combined into a single ultrasound pulse.

30. (Original) The transducer array of claim 28, and comprising passive circuitry to reduce non-fundamental frequencies in the ultrasound pulse produced by combining the signals from the first and second transmitters.

31. (Original) The transducer array of claim 18, wherein the transducer array processes signals from each active transducer layer separately to provide simultaneous display of a region with different receive beam forming and filtering.

32. (Original) The transducer array of claim 18, wherein the transducer array combines filtered and amplified receive signals from each active transducer layer before display to enhance image quality.

33. (Original) The transducer array of claim 18, wherein the transducer array combines filtered and amplified receive signals from each active transducer layer before display to display specific signal features.

34. (Original) The transducer array of claim 18, wherein the transducer array combines filtered and amplified receive signals from each active transducer layer before display to display harmonic frequency generation and imaging of contrast agents within tissue.

35. (Original) The transducer array of claim 18, and comprising circuitry wherein a first pulse and a second pulse are processed by the circuitry to have at least one of the following: different amplitudes, different time delays, and different shapes, after being received by the first and second receivers.

36. (Original) The transducer array of claim 18, and comprising circuitry wherein a first pulse and a second pulse are processed by the circuitry to have at least one of the following: different amplitudes, different time delays, and different shapes, prior to being amplified in the first and second receivers.

37. (Original) The transducer array of claim 18, and comprising circuitry wherein a first pulse and a second pulse are processed by the circuitry to have at least one of the following: different amplitudes, different time delays, and different shapes, prior to and after being amplified in the first and second receivers.

38. (Original) The transducer array of claim 18, and comprising circuitry wherein a first pulse and a second pulse are processed by the circuitry to have at least one of the following: different amplitudes, different time delays, and different shapes, after being amplified in the first and second receivers.

39. (Original) The transducer array of claim 18, wherein the array is a linear array.

40. (Original) The transducer array of claim 18, wherein the array is a two-dimensional array.

41. (Currently amended) A linear transducer array comprising N transducer elements wherein active transducer layers are arranged to obtain frequency variable apodization across the array during transmission,

wherein first and second transducer elements of the N transducer elements each include first and second active layers,

wherein a frequency response of first and second active layers of the first transducer element is equivalent to a frequency response of first and second active layers of the second transducer element,

wherein the second transducer element is symmetrically positioned relative to the first transducer element.

42. (Original) The transducer array of claim 41, and comprising passive circuitry wherein the passive circuitry provides at least one of the following: receive amplification, receive filtering, or receive focusing to signals from the different layers.

43. (Currently amended) A method of transmitting an ultrasound pulse comprising the steps of:

providing a transducer element having a first active transducer layer connected to a first transmitter and a second active transducer layer laminated to the first active transducer layer and connected to a second transmitter,

wherein said first active transducer layer includes a first pair of composite layers and said second active transducer layer includes a second pair of composite layers;

transmitting a first signal into the first active transducer layer to produce a first ultrasound pulse; and

transmitting a second signal into the second active transducer layer to produce a second ultrasound pulse.

44. (Original) A method of receiving an ultrasound pulse comprising the steps of:

providing a transducer element comprising a first active transducer layer connected to a first receiver and a second active transducer layer connected to a second receiver;

receiving a first signal in the first receiver;

receiving a second signal in the second receiver; and

combining the first and second signals prior to image coding.

45. (Original) The method of claim 44 wherein at least one filtering step is performed prior to amplification in both of the receiving steps.

46. (Original) The method of claim 44 wherein at least one filtering step is performed after amplification in both of the receiving steps.

47. (Original) The method of claim 44 wherein at least one filtering step is performed prior to amplification in both of the receiving steps and at least one filtering step is performed after amplification in both of the receiving steps.

48. (Original) The method of claim 44 wherein at least one filtering step is performed after analog-to-digital conversion in both of the receiving steps.

49. (Original) The method of claim 44 wherein at least one filtering step is performed after amplification and before analog-to-digital conversion in both of the receiving steps.

50. (Original) The method of claim 44 wherein at least one filtering step is performed before analog-to-digital conversion in both of the receiving steps.

51. (Currently amended) A method of transmitting and receiving an ultrasound pulse comprising the steps of:

providing a transducer element for ultrasound transmission and reception comprising:

a first active transducer layer connected to a first receiver and a first transmitter; and

a second active transducer layer laminated to the first active transducer layer and connected to a second receiver and a second transmitter,

wherein said first active transducer layer includes a first pair of composite layers and said second active transducer layer includes a second pair of composite layers;

transmitting a first signal into the first active transducer layer to produce an ultrasound pulse;

transmitting a second signal into the second active transducer layer to produce an ultrasound pulse; and

receiving a signal in at least one of the first and second receivers.

52. (Original) The method of claim 51, and comprising the step of filtering the signal after the signal is received in the at least one of the first and second receivers.

53. (Original) The method of claim 51, wherein:

the step of receiving a signal in at least one of the first and second receivers comprises the steps of receiving a first signal in a first receiver and receiving a second signal in a second receiver; and

the step of combining the first and second signals follows a step of filtering the first and second signals prior to image coding.

54. (Original) A method of transmitting and receiving an ultrasound pulse comprising the steps of:

providing a transducer array comprising:

a plurality of transducer elements wherein a first transducer element and a second transducer element each comprise a first active transducer layer connected to a first receiver and a second active transducer layer laminated to the first active transducer layer and connected to a second receiver;

transmitting a first signal into the first active transducer layer of the first transducer element to produce a first ultrasound pulse;

transmitting a second signal into the second active transducer layer of the first transducer element to produce a second ultrasound pulse;

transmitting a third signal into the first active transducer layer of the second transducer element to produce a third ultrasound pulse;

transmitting a fourth signal into the second active transducer layer of the second transducer element to produce a fourth ultrasound pulse;

receiving a first receive signal in the first receiver of the first transducer element;

filtering the first receive signal in the first transducer element;

receiving a second receive signal in the second receiver of the second transducer element;

filtering the second receive signal in the second transducer element;

combining the first receive signal with another receive signal of the first transducer element following the filtering of the first receive signal prior to image coding; and

combining the second receive signal with another receive signal of the second transducer element following the filtering of the second receive signal prior to image coding.

55. (Original) The method of claim 54, wherein a first active transducer layer of a first transducer element comprises different material than a first active transducer layer of a second transducer element.

56. (Original) The method of claim 55, wherein a second active transducer layer of a first transducer element comprises different material than a second active transducer layer of a second transducer element.

57. (Original) The method of claim 55, wherein the first receiver and the second receiver have different electrical properties.

58. (Original) The method of claim 54, wherein the first active transducer layer and the second active transducer layer are connected to circuitry having different electrical properties.

59. (Original) The method of claim 54, wherein the first active transducer layer of a first element is connected to a circuit having different properties than a circuit connected to a first active transducer layer of a second element.

60. (Original) The method of claim 54, in which at least two of the active transducer layers are connected to separate focusing electronics to provide independent focusing.

61. (Original) The method of claim 54, in which all of the active layers within a single transducer element are connected to separate focusing electronics to provide independent focusing.

62. (Original) The method of claim 54, wherein the first and second receivers each comprise electrical filtering capability to optimize a combined received pulse prior to image coding.